

CLAIMS

1. A magnetic resonance system for therapeutically treating a patient, comprising:  
a medical device adapted to be inserted into a patient, having three or more magnetic resonance tracking coils;  
a magnetic resonance system having a number of receivers equal to or greater than the number of coils, a tracking system coupled with each of the receivers to independently track the three-dimensional positions of all of the coils at a rate of at least about 5 positions per second;  
a display depicting a magnetic resonance image defining a scan plane and superimposing the position of each coil in the scan plane onto a corresponding position on the magnetic resonance image; the display also depicting a visible indicator connecting adjacent coils on the medical device.
2. The magnetic resonance system in accordance with claim 1, further comprising one or more additional medical devices, each having at least one magnetic resonance tracking coil; each magnetic resonance tracking coil being coupled with a corresponding receiver of the magnetic resonance system.
3. The magnetic resonance system in accordance with claim 1, wherein the medical device is provided with a multitude of twenty or more magnetic resonance tracking coils.
4. The magnetic resonance system in accordance with claim 1, wherein the medical device is a catheter.

5. The magnetic resonance system in accordance with claim 1, wherein the medical device is a guidewire.
6. The magnetic resonance system in accordance with claim 1, wherein the tracking system uses a Hadamard multiplexing algorithm to minimize artifacts.
7. The magnetic resonance system in accordance with claim 1, wherein the visible indicator is a line shown on the display, connecting the indicated positions of adjacent coils.
8. The magnetic resonance system in accordance with claim 1, wherein the magnetic resonance system scans only the positions of the coils and operates at a lower acoustic noise level than scanning to obtain an image.
9. The magnetic resonance system in accordance with claim 1, in which the tracking system tracks the positions of all of the coils, wherein at least some of the coils are outside the current scan plane.
10. The magnetic resonance system in accordance with claim 1, further comprising at least one additional magnetic resonance image defining a second scan plane, wherein the positions of each of the tracking coils in the second scan plane are superimposed onto a corresponding position on the additional magnetic resonance image.

11. A magnetic resonance system for therapeutically treating a patient, comprising:  
at least two medical devices adapted to be inserted into a patient, each having at least three magnetic resonance tracking coils;

a magnetic resonance system having a number of receivers equal to or greater than the total number of coils, a tracking system coupled with each of the receivers to independently track the three-dimensional positions of all of the coils at a rate of at least about 5 positions per second;

a display depicting a magnetic resonance image defining a scan plane and superimposing the position of each coil in the scan plane onto a corresponding position on the magnetic resonance image; the display also depicting a visible indicator connecting adjacent coils on each of the medical devices.

12. A magnetic resonance system for therapeutically treating a patient, comprising:  
a medical device adapted to be inserted into a patient, having three or more magnetic resonance tracking coils;

a magnetic resonance system having a number of receivers equal to or greater than the total number of coils, a tracking system coupled with each of the receivers to independently track the three-dimensional positions of all of the coils at a rate of at least about 5 positions per second;

a display depicting at least a first and second magnetic resonance image defining a first and second scan plane and superimposing the position of each coil in one of the scan planes onto a corresponding position on the corresponding magnetic resonance image; the display also depicting a visible indicator connecting adjacent coils on the medical device.